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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TODD YECK, NIELS KIRK THOMSEN,
and JOHN CLOPTON DUNAWAY[1]

Appeal 2015-003047
Application 13/625,753
Technology Center 1600

Before ERIC B. GRIMES, MELANIE L. McCOLLUM, and
RYAN H. FLAX, *Administrative Patent Judges*.

FLAX, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) involving claims directed to a method of (or program/system for) biochemical data analysis. Claims 1–21 are on appeal as rejected under 35 U.S.C. § 103(a). We have jurisdiction under 35 U.S.C. § 6(b).

We affirm with respect to the rejection as to claim 1 and reverse with respect to the rejection as to claims 3, 4, 7, and 11.

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[1] We understand the Real Party in Interest to be Bio-Rad, Digital Biology Center. App. Br. 3.

STATEMENT OF THE CASE

"The present invention relates generally to biochemical data analysis, and more specifically to analysis of biochemical data using user-supplied parameters." Spec. ¶ 2. The Specification states,

> [experimental] data can be voluminous with a wide variety of characteristics, and consequently cumbersome to manage and analyze. Current users often employ Excel, performing many manual steps for importing data into spreadsheets, for selecting categories of data from the entire dataset for evaluation and comparison, and for providing macros for statistical calculations and charting[,]

but this presents difficulties to users, is time consuming, and causes potential errors and invokes business risk. Spec. ¶ 3.

The Specification describes an analysis system that can receive "an experimental results dataset for a plurality of biological samples." Spec. ¶ 38. Such a "dataset may comprise . . . various attributes (fields)," with information such as "gender, age, disease condition, etc." Spec. ¶ 39.

A system user selects an analyte for data analysis, e.g., blood plasma levels of analyte "X," using a graphical interface drop-down menu/box. Spec. ¶ 42. Then, the user selects a "compare field," for example, "gender, ethnicity, sex, [or] disease condition." Spec. ¶ 43. The Specification further explains, "user supplied parameters and criteria are employed to generate sub-groups of data for statistical analysis" where,

> the sub-groups are based on the selected compare field. For example, given a dataset for analysis having 900 total rows of data: with 300 rows having a value of "lung cancer" for a condition column, 300 rows having a value of "colon cancer" for a condition column, and 300 rows having a value of "normal" for

> a condition column, three different sub-groups may be determined.

Spec. ¶ 50.

Finally, "many options exist for the data to be analyzed, the calculations to be performed on the data, and how the data and any calculated values (e.g. statistical values) are to be displayed." Spec. ¶ 51. "Various plots generated based on the statistical analysis may be displayed for each sub-population of data." Spec. ¶ 54. "The displayed graphs may be scatter plots, bar charts, box and whisker charts, or any other suitable graphical representation of statistical data." Spec. ¶ 55.

The appealed claims can be found in the Claims Appendix of the Appeal Brief. Claims 1, 14, and 18 are the independent claims. Claim 1 is representative and reads as follows:

> 1. A method of biochemical data analysis, the method comprising:
>
> receiving, at a computer system, a dataset for a plurality of biological samples, the dataset having a plurality of fields for each biological sample, at least a portion of the dataset being obtained from experiments involving the biological samples, wherein the dataset includes:
>
> > a plurality of first fields, each first field including a plurality of values, each value corresponding to a respective characteristic of a respective biological sample, and
> >
> > a plurality of second fields, each second field corresponding to a respective analyte and including a plurality of concentrations of the respective analyte in the experiments, each concentration corresponding to a respective biological sample;

displaying a list of the plurality of first fields in a first region of a user interface (UI) page of the computer system in response to a selection of a drop-down box in the UI page;

receiving a selection of a compare field from the list of the plurality of first fields;

identifying, by the computer system, subgroups of the biological samples in the dataset for statistical analysis based on the plurality of values for the compare field, wherein biological samples of a subgroup have a same value for the compare field;

displaying a list of the plurality of second fields in a second region of the UI page;

receiving a selection of an analyte from the list of the plurality of second fields for statistical analysis; and

providing, based on the received selections of the analyte and the compare field, a display of information separated by subgroups to convey statistical information for the selected analyte for each subgroup of the compare field, wherein the information separated by subgroups is displayed within a third region of the UI page to facilitate visual comparison.

App. Br. 16 (Claims App'x).

The following rejection is on appeal:

Claims 1–21 stand rejected under 35 U.S.C. § 103(a) over Ford,[2] Robbins,[3] and SigmaPlot[4] or Cappione[5] or Yakhini[6] or Leban[7] or Kelly[8] or Zeringue.[9] Final Action 3.

Except where otherwise indicated, we adopt the Examiner's findings of fact, reasoning on scope and content of the prior art, and conclusions set out in the Final Action and Answer. The findings of fact set forth below are provided only to highlight certain evidence of record.

FINDINGS OF FACT

FF1. Ford disclosed:

> The present invention relates to methods of formulating analyte data databases (comprising, analyte data points, derived data, and data attributes), the analyte data databases themselves, and to

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[2] U.S. Patent Application Pub. No. US 2002/0045808 A1 (published Apr. 18, 2002) (hereinafter "Ford").
[3] U.S. Patent Application Pub. No. US 2009/0307527 A1 (published Dec. 10, 2009) (hereinafter "Robbins").
[4] SigmaPlot, *Exact Graphs and Data Analysis* (brochure, update available at http://www.sigmaplot.com/products/sigmaplot/produpdates/prod-updates5.php) (dated 2010–11; *see* Ans. 9) (hereinafter "SigmaPlot").
[5] U.S. Patent Application Pub. No. US 2008/0263468 A1 (published Oct. 23, 2008) (hereinafter "Cappione").
[6] U.S. Patent Application Pub. No. US 2004/0080536 A1 (published Apr. 29, 2004) (hereinafter "Yakhini").
[7] U.S. Patent Application Pub. No. US 2010/0082634 A1 (published Apr. 1, 2010) (hereinafter "Leban").
[8] U.S. Patent Application Pub. No. US 2009/0248443 A1 (published Oct. 1, 2009) (hereinafter "Kelly").
[9] U.S. Patent Application Pub. No. US 2009/0024940 A1 (published Jan 22, 2009) (hereinafter "Zeringue").

> methods for manipulating and analyzing the analyte data databases.

Ford ¶ 5; *and see* claims 1–7; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford). Thus, Ford disclosed biochemical data analysis utilizing a dataset of biological samples.

FF2. Ford disclosed:

> A "database" is a collection of data points and data attributes associated with each data point. Thus, an "analyte data points, derived data, and data attributes database" is a database comprising data points collected, e.g. by an analyte monitoring device, data derived from the original data points and the data attributes associated with those data points or the derived data. A database may be limited to data points comprising measurements of one or more analyte levels; those data points may further be collected from one or more subjects.

Ford ¶ 61; *and see* claims 1–13, ¶¶ 73–74, 96–97; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford). Thus, Ford disclosed a dataset as a collection of data for biological samples, including analyte data points, such as concentrations of analyte(s) as values.

FF3. Ford disclosed, "[a]nalyte measurements and derived data points are collected and calculated, respectively, and may be associated with one or more data attributes to form a database," and analyte attributes include, but are not limited to:

> chronological information . . . ; user perspiration levels . . . ; [] device operating temperature . . . ; user body temperature; user skin conductance; environmental variables (e.g., temperature, temperature changes, humidity, sun exposure, etc.) and number and type (e.g., hyperglycemic or hypoglycemic) of alarm events[;]

> . . . various activities affecting analyte levels, such as caloric intake and/or output (e.g., food, physical activity, etc.), sleep and administration of medications, including the dose and time thereof[;]
>
> . . . analyte values[;] . . . and
>
> . . . subject identifiers, i.e. characteristics associated with a particular subject [such as:] . . . (1) a subject code (e.g., a numeric or alpha-numeric sequence); (2) demographic information such as race, gender and age; (3) physical characteristics such as weight, height and body mass index (BMI); (4) selected aspects of the subject's medical history (e.g., number of pregnancies, disease states or conditions, etc.); and (5) disease-associated characteristics such as the type of analyte disorder, if any; the type of medication used by the subject, if any; and the presence or absence of surrogate analyte markers.

Ford ¶¶ 114–118 (section 2.5); *and see* claim 12; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford). Thus, Ford disclosed that analyte data points of its disclosed dataset are associated with other information or values relating to the respective biological subjects or biological data-gathering.

FF4. Ford disclosed:

> "Data mining" refers to the process of selecting, exploiting, modeling, etc., large amounts of data to uncover previously unknown trends, patterns, and relationships within and among various data points and data attributes. "Data aggregation" and "data clustering" refers to the process of grouping data points on the basis of one or more common attributes. Conversely, "data segmentation" refers to the process of differentiating data into discrete groups on the basis of one or more attributes.

Ford ¶ 61; *and see* claims 1, 9, 13, and 27; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford); *see also, e.g.*, Ford ¶ 157 (disclosing a computer system receiving a dataset and request for

database server resources). Thus, Ford disclosed a variety of ways of organizing, analyzing, sub-grouping, filtering, and comparing data points in a dataset of biological samples.

FF5. Ford disclosed:

> Usually each networked computer system, PDA or PPC includes a World Wide Web browser that provides a user interface to the networked database server. The networked computer system, PDA or PPC is able to construct search requests for retrieving information from a database via a Web browser. With access to a Web browser users can typically point and click to user interface elements such as buttons, pull down menus, and other graphical user interface elements to prepare and submit a query that extracts the relevant information from the database. Requests formulated in this manner are subsequently transmitted to the Web application that formats the requests to produce a query that can be used to extract the relevant information from the database.

Ford ¶ 158; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford). Thus, Ford disclosed querying a system via, e.g., cursor movements and mouse clicks at graphical objects, such as buttons and pull-down menus, the system receiving the query, and the system displaying relevant database information, e.g., a sub-group of data, in response to the query.

FF6. Ford disclosed:

> Graphical User Interface
>
> In certain of the computer systems, an interface such as an interface screen that includes a suite of functions is included to enable users to easily access the information they seek from the databases of the invention. Such interfaces usually include a main menu page from which a user can initiate a variety of different types of analyses (such as discussed above, for

> example, initiate a search for hypoglycemic events and related attributes, followed by initiating a selected analysis to identify salient factors). For example, the main menu page for the databases generally include buttons for accessing certain types of information, including, but not limited to, project information, inter-project comparisons, times of day, events, dates, times, ranges of analyte values, etc.

Ford ¶¶ 163–64; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford). Thus, Ford disclosed visual displays and a suite of functions for users to show information about both analyte values, e.g., concentrations, and related attribute information of the respective biological samples, e.g., age, gender, disease condition, for comparisons and analysis.

FF7. Ford disclosed its database design can be rational, relational, and/or dimensional, where a relational database supports a set of operations defined by relational algebra and includes tables composed of columns and rows for the data of the database and typically supports operations to select, join, and combine data. Ford ¶¶ 123–26; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford).

FF8. Ford disclosed:

> data sets may be aggregated, sorted, selected, sifted, clustered and segregated by means of the attributes associated with the data points. A number of database management systems and data mining software programs exist which may be used to perform the desired manipulations.
>
> Relationships in the database can be directly queried and/or the data analyzed by statistical methods to evaluate the information obtained from manipulating the database.
>
> For example, a distribution curve can be established for a selected data set, and the mean, median and mode calculated

> therefor. Further, data spread characteristics, e.g. variability, quartiles and standard deviations can be calculated.
>
> The nature of the relationship between a particular variable and analyte levels can be examined by calculating correlation coefficients. Useful methods for doing so include but are not limited to the following: Pearson Product Moment Correlation and Spearman Rank Order Correlation.

Ford ¶¶ 130–33; *see also* Final Rejection 3–8 and Ans. 2–8 (discussing Ford). Thus, Ford disclosed a variety of ways of organizing, manipulating, choosing, and filtering data points of a database based on associated attributes and relationships between biological sample attributes and respective analyte information. Moreover, Ford disclosed developing and conveying statistical information relating to and comparing these data points. Such analyses are displayed to a user. *See, e.g.*, Ford ¶¶ 147 and 154.

FF9. Robbins also disclosed drop-down menus for selecting fields of information from a database. *See, e.g.*, Robbins Fig. 9 (element 348), ¶ 40, claim 19; *see also* Ans. 5 (discussing Robbins).

FF10. Robbins disclosed the term "fields" refers to data associated with subjects of a database. *See, e.g.*, Robbins claim 15; *see also* Ans. 5 (discussing Robbins).

FF11. SigmaPlot disclosed "a scientific data analysis and graphing software package" where data may be analyzed (and dynamically updated) based on a selection of analyte data points from a table menu and via an "Interactive Graph Wizard." SigmaPlot 2; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

FF12. SigmaPlot disclosed multiple windows of information (e.g., data points) and graphical displays on a single screen. SigmaPlot 2; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

FF13. SigmaPlot disclosed the ability to select "up to four measured variables to quickly detect and demonstrate possible product defects." SigmaPlot 5.

FF14. Cappione disclosed, "[a] graphical user interface on a computer for the analysis of location specific data and the presentation of analysis results for visual comparison by a user" and shows a display having multiple regions thereon for showing different sets of data or analyses. Cappione Abstract, Figs. 15–18; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

FF15. Yakhini disclosed, "[a]n interactive user interface that allows a user to display microarray data, and other data, including genetic, biochemical, and chemical data, in various ways to facilitate human analysis of the displayed data within the context of the genetic, biochemical, chemical, or other experiments from which the data is obtained," and "[t]he user interface provides a user with the ability to rank and sort data on a row basis, as well as the ability to partition columns into meaningful groups" and "allows a researcher to modify ranking, partitioning, scaling, and other parameters of the display in real time, in order to visually explore and navigate various different relationships and correlations between individual data array."

Yakhini Abstract; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

FF16. Leban disclosed, "[a] computer-implemented system, method, and user interface for searching and organizing information," and "[i]nformation is organized and searched according to content, and this organization is reflected directly in the user interface provided to users for searching as well as the search results they are shown." Leban Abstract, Figs.; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

FF17. Kelly disclosed showing multiple windows of database information, including drop-down menus for selecting data groups, on a display. Kelly Figs. 5–19; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

FF18. Zeringue disclosed "[a] computer-implemented graphical user interface system for generating a database query includes a create region, a plurality of clause-specific regions and a navigation region" and displays of multiple windows of database information. Zeringue Abstract, Fig. 2; *see also* Ans. 5–6 (discussing common features of data analysis and graphing software packages and displays).

DISCUSSION

The rejection of claim 1 under 35 U.S.C. § 103(a) over Ford, Robbins, and SigmaPlot or Cappione or Yakhini or Leban or Kelly or Zeringue.

The Examiner established a prima facie case that claim 1 would have been obvious over the cited prior art. Appellants have not presented persuasive evidence that this determination is incorrect. We address Appellants' arguments below.

"The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). "[W]hen the question is whether a patent claiming the combination of elements of prior art is obvious," the answer depends on "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 417. "[T]he analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *Id.* at 418.

First, Appellants contend the Examiner's use of the word "could" instead of "would," in relation to how one of ordinary skill in the art could/would interpret and understand the teachings of the prior art was improper. App. Br. 7–8. This is not persuasive. Although the rejection in the Final Rejection uses the word "could" instead of "would," the Examiner provides a reason for combining the references: "to provide convenience of comprehensive data analysis and display of the results." (Final Rejection 7.) In any event, Appellants have been well apprised of the Examiner's

determinations and rationale on the obviousness of the claimed subject matter and have mounted a full and complete response thereto.

Appellants contend the Examiner's cited prior art combination fails to teach "displaying a list of the plurality of first fields in a first region of a user interface (UI) page of the computer system in response to a selection of a drop-down box in the UI page." App. Br. 8. The argument is not persuasive.

As determined by the Examiner, the Ford reference disclosed a database (or dataset) composed of data points for analytes (concentrations) and related attributes of respective biological samples or subjects. FF1–FF10. Further, as determined by the Examiner, Ford disclosed that such data is accessed and viewed and manipulated by a user via a graphical user interface connected to a computer system or network. FF5–6. Further, as determined by the Examiner, Ford disclosed that a user queries and extracts information, e.g., data mining, from the database using typical and well known on-screen interactions, such as cursor clicks and drop-down menus. FF4 and FF5. It would have been obvious to populate the disclosed drop-down menus with the also disclosed analyte and attribute information (as "fields," or areas/spaces/regions, of data) for this purpose and it would likewise have been obvious that the system must "receive" inputs, such as selections of data or groups of data from such datasets, in order to provide the data mining results requested by the user.

Appellants also argue that the cited prior art combination fails to teach displaying the first and second fields in first and second regions of the UI page and providing a display of information relating to selections of the first

and second fields in a third region of the UI page. App. Br. 10. This argument is not persuasive.

As discussed above, as determined by the Examiner, it would have been obvious, based on Ford, to populate various drop down menus with analyte data and attribute data or, put in the language of the claims, first fields of biological sample characteristic values and second fields of respective analyte concentration values of those biological samples. *See* FF1–FF3, FF5; *see also* FF9 and FF10 (Robbins). Further, it would also have been obvious to show these drop down menus on a display, as taught by Ford. FF5–FF6. Further, it would have been obvious to sort, select and segregate the data selected via these drop down menus to conduct statistical analysis about relationships therebetween, as disclosed by Ford. FF8. Moreover, it would have been obvious to also show a visual display of this analysis, as disclosed by Ford, as, e.g., a distribution curve. FF8. As shown by the various other references (*see* SigmaPlot, Cappione, Yaknini, Leban, Kelly, and Zeringue), displaying the drop down menus and the visual depiction of statistical analysis in various windows or, to use the language of the claims, regions, on a screen would also have been obvious. FF11–FF18.

Finally, Appellants argue that the SigmaPlot reference is not prior art. App. Br. 7. However, it is conceded by Appellants that the SigmaPlot reference relates to ("lists") a product for the years 2010–2011. *Id.* If the brochure and product were available anytime in the year 2010, then the relevant date for the reference can be no later than December 31, 2010, which makes it prior art to the appealed claims.

For the reasons above, we affirm the obviousness rejection of claim 1. Because they are not separately argued, claims 2, 5, 6, 8–10, and 12–21 fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The rejection of claims 3, 4, 7, and 11 under 35 U.S.C. § 103(a) over Ford, Robbins, and SigmaPlot or Cappione or Yakhini or Leban or Kelly or Zeringue.

"[W]hen obviousness is at issue, . . . [t]he examiner, and if later involved, the Board, retain the ultimate burden of persuasion on the issue. If, as a matter of law, the issue is in equipoise, the applicant is entitled to the patent." *In re Oetiker*, 977 F.2d 1443, 1449 (Fed. Cir. 1992) (J. Plager, concurring).

Here, the Examiner has provided only a cursory explanation as to the rationale for the rejection of these depending claims, basing it on the contention that the limitations added in these claims are "minor in nature," "known *per se*," "slight constructional changes," and/or "conventional steps." *See* Ans. 7. Appellants object to this unsupported, conclusory rationale. App. Br. 13–14. We agree with Appellants.

"[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR* 550 U.S. at 418 (*quoting In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). There may well be rational reasons, based on the prior art of record, why these dependent claims would have been obvious over the

cited prior art, but these reasons are not presented by the Examiner here. We reverse the rejection of claims 3, 4, 7, and 11.

SUMMARY

The rejection under 35 U.S.C. § 103(a) over Ford, Robbins, and SigmaPlot or Cappione or Yakhini or Leban or Kelly or Zeringue is affirmed with respect to claims 1, 2, 5, 6, 8–10, and 12–21 and is reversed with respect to claims 3, 4, 7, and 11.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART